

Amendments to the Claims

Please cancel claims 1-31 without prejudice, and add new claims 32-62, as follows:

Claims 1-31 (cancelled).

Claim 32 (new). Apparatus for providing optical radiation defined by a signal wavelength, the apparatus comprising:

at least one pump configured to provide pump radiation;

a gain medium; and

energy limiting means;

and wherein:

the pump radiation acts on the gain medium to provide stored energy and gain for optical amplification;

the gain has a maximum gain at a wavelength at which the maximum gain occurs; and

the energy limiting means limits the maximum gain and the amount of stored energy that is able to be stored to values below those at which the stored energy will cause damage to the apparatus.

Claim 33 (new). The apparatus of claim 32 wherein the gain medium is such that the signal wavelength and the wavelength at which the maximum gain occurs are separated by less than 10nm.

Claim 34 (new). The apparatus of claim 32 wherein the gain medium is such that the signal wavelength and the wavelength at which the maximum gain occurs are separated by at least 10nm.

1 Claim 35 (new). The apparatus of claims 32 wherein the energy limiting means
2 comprises first and second reflectors defined by first and second reflectivities and an
3 energy limiting wavelength, and wherein:

4 the first and second reflectors form a cavity about the gain medium; and

5 the first and second reflectors being such that they limit the available gain
6 when the gain medium is pumped by the pump such that the stored energy is unable
7 to cause damage to the apparatus.

8

9 Claim 36 (new). The apparatus of claim 35 wherein the first reflectivity is greater
10 than the second reflectivity.

11

12 Claim 37 (new). The apparatus of claim 35 wherein the first reflectivity is the
13 same as the second reflectivity.

14

15 Claim 38 (new). The apparatus of claim 35 wherein the first reflectivity is less
16 than the second reflectivity.

17

18 Claim 39 (new). The apparatus of claim 35 wherein at least one of the first and
19 second reflectors is configured to reflect at least 0.01% of optical radiation at the
20 energy limiting wavelength.

21

22 Claim 40 (new). The apparatus of claim 35 wherein a product of the first
23 reflectivity times the second reflectivity is substantially equal to a reciprocal of twice
24 the small signal gain at the energy limiting wavelength.

25

Claim 41 (new). The apparatus of claim 40 wherein the gain medium is pumped
by at least 1W of the pump radiation, and the maximum gain is less than 40dB.

1 Claim 42 (new). The apparatus of claim 41 wherein the gain medium is pumped
2 by at least 10W of the pump radiation, and the maximum gain is less than 30dB.
3

4 Claim 43 (new). The apparatus of claim 42 wherein the gain medium is pumped
5 by at least 100W of the pump radiation, and maximum gain is less than 25dB.
6

7 Claim 44 (new). The apparatus of claim 43 wherein the gain medium is pumped
8 by at least 1000W of the pump radiation, and the maximum gain is less than 20dB.
9

10 Claim 45 (new). The apparatus of claim 32 wherein:

11 the gain medium is pumped by the pump radiation at a pump power of at
12 least 1W;

13 the energy limiting means comprises an optical source that provides at an
14 energy limiting wavelength an energy limiting power greater than 40dB relative to
15 the pump power; and

16 the energy limiting power acts on the gain medium to reduce the amount of
17 stored energy and gain when the gain medium is pumped by the pump such that the
18 stored energy is unable to cause damage to the apparatus.

19

20 Claim 46 (new). The apparatus of claim 45 wherein the gain medium is pumped
21 by at least 10W of the pump power, and the energy limiting source provides an
22 energy limiting power greater than 30dB relative to the pump power.

23

24 Claim 47 (new). The apparatus of claim 46 wherein the gain medium is pumped
25 by at least 100W of the pump power, and the energy limiting source provides an
energy limiting power greater than 25dB relative to the pump power.

1 Claim 48 (new). The apparatus of claim 47 wherein the gain medium is pumped
2 by at least 1000W of the pump power, and the energy limiting source provides an
3 energy limiting power greater than 20dB relative to the pump power.

4

5 Claim 49 (new). The apparatus of claims 35 wherein the energy limiting
6 wavelength is in the same emission band as the signal wavelength.

7

8 Claim 50 (new). The apparatus of claim 35 wherein the energy limiting
9 wavelength is in a different emission band from the signal wavelength.

10

11 Claim 51 (new). The apparatus of claim 35 wherein the energy limiting
12 wavelength is greater than the signal wavelength.

13

14 Claim 52 (new). The apparatus of claim 35 wherein the energy limiting
15 wavelength is less than the signal wavelength.

16

17 Claim 53 (new). The apparatus of claim 35 wherein the energy limiting
18 wavelength and the wavelength at which the maximum gain occurs are separated by
19 less than 10nm.

20

21 Claim 54 (new). The apparatus of claim 35 wherein the energy limiting
22 wavelength and the wavelength at which the maximum gain occurs are separated by
23 at least 10nm.

24

25 Claim 55 (new). The apparatus of claim 32 wherein the optical radiation is
coupled to a scanner.

1 Claim 56 (new). The apparatus of claim 55 further comprising a controller
2 configured to synchronize the optical radiation with the scanner.

3

4 Claim 57 (new). The apparatus of claim 32 wherein the gain medium forms part
5 of an optical fibre.

6

7 Claim 58 (new). The apparatus of claim 57 wherein the optical fibre comprises
8 rare-earth dopant.

9

10 Claim 59 (new). The apparatus of claim 58 wherein the optical fibre comprises a
11 cladding pumped optical fibre comprising a core, an inner cladding configured to
12 guide pump radiation supplied by the pump, and an outer cladding, and wherein the
13 rare earth dopant is disposed in at least one of the core or the inner cladding.

14

15 Claim 60 (new). The apparatus of claim 58 wherein the rare-earth dopant is
16 selected from the group consisting of Ytterbium, Erbium, Neodymium,
17 Praseodymium, Thulium, Samarium, Holmium and Dysprosium, Erbium codoped
18 with Ytterbium, and Neodymium codoped with Ytterbium.

19

20 Claim 61 (new). The apparatus of claim 32 wherein the apparatus is in the form
21 of an amplifier, a laser, a master oscillator power amplifier, a Q-switched laser, a
22 source of amplified spontaneous emission, or a continuous wave laser.

23

24 Claim 62 (new). The apparatus of claim 32 wherein the apparatus is in the form
25 of a laser for material processing.

(End of amendments.)